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**Richa Srivastava**  
Research Scholar, SHUATS,  
Allahabad, Uttar Pradesh, India

**Neeru Bala**  
Associate Professor, SHUATS,  
Allahabad, Uttar Pradesh, India

**Anisha Verma**  
Associate Professor, SHUATS,  
Allahabad, Uttar Pradesh, India

## Psychological distress levels & it's relationship with nutritional status of polycystic ovarian syndrome population in Allahabad city

**Richa Srivastava, Neeru Bala and Anisha Verma**

### Abstract

Polycystic Ovarian Syndrome is a complex endocrinopathy affecting 5 to 10% women of reproductive age worldwide. It has been reported in previous studies that PCOS affects quality of life and can worsen existing anxiety and depression either due to the features of PCOS or associated comorbidities.

**Objective:** 1) To find out Nutritional Status of PCOS population in Allahabad city. 2) To find out the association between Nutritional Status and Psychological Distress levels among PCOS sufferers.

**Materials & Methods:** In this cross-sectional, hospital based, descriptive, case-control study, 150 PCOS Patients (Cases) were recruited from various Hospitals & 150 Controls were selected from various localities of Allahabad city. A self made questionnaire was used for data regarding Nutritional Status & Psychological Distress levels were assessed using the P.G.I Health Questionnaire N1. Statistical analyses were performed using SPSS Ver. 20.0. Chi Square test was used to test the association between variables. A p-value less than 0.05 was considered as statistically significant.

**Results:** The findings of the study revealed that macronutrient intake among concerned population were almost similar as reported in earlier studies while micronutrient intake were reported less in comparison with RDA. Overweight to Underweight population were reported more. However, Abdominal Obesity was reported in majority of cases. Major population were not having hyperglycaemia or NIDDM, Hypertension, NAFLD & Hypothyroidism as believed to be associated with PCOS, while cases had Anaemia and Bone Pain even more than the controls.

**Conclusion:** The research study revealed that most of the PCOS subjects having wide variation in Nutritional Status comes under moderate to severe neuroticism.

**Keywords:** polycystic ovarian syndrome, endocrinopathy, psychological distress, nutritional status

### Introduction

Polycystic Ovarian Syndrome is a serious endocrinopathy affecting females of reproductive age and the biggest concern is it's unknown cause, which is still a riddle for the whole world. It is estimated that 5 to 10% of women suffer from the disease [1] On the basis of previous studies, insulin resistance believed to be a biggest culprit behind testosterone (a male hormone) overproduction which somehow affects the ovaries function & hampers hormonal homeostasis resulting into production of numerous small collections of fluid (cyst) due to which ovaries fail to release eggs leading to infertility in concerned population. Major causes behind insulin resistance are believed to be Bad Dietary Habits, Sedentary Lifestyle, Genetic History and Stress. On the Basis of Previous researches, PCOS Sufferers are reported to be more prone to depression and other associated comorbidities during the course of the disorder in comparison to general population. The present study reveals the facts about Nutritional Status of the concerned population which includes Anthropometric measurements, Nutrient Intake, Comorbidities & it's relationship with Psychological Distress Levels of PCOS Sufferers.

**Purpose of Study:** To find out the association between Psychological Distress levels & Nutritional Status of PCOS population in Allahabad City.

### Hypothesis

- **Ho I:** There is no significant association between Groups (Case & Control) & Nutritional Status.
- **Ha:** There is a significant association between Groups (Case & Control) & Nutritional Status.
- **Ho II:** There is no significant association between Groups (Case & Control) & Psychological Distress levels.

### Correspondence

**Richa Srivastava**  
Research Scholar, SHUATS,  
Allahabad, Uttar Pradesh, India

- **Ha:** There is a significant association between Groups (Case & Control) & Psychological Distress levels.

## Materials and Methods

The present research study was approved by Department of Food, Nutrition & Public Health, Ethelind College of Home Science, SHUATS, Allahabad, U.P, India. It was a cross-sectional, descriptive, age matched case-control study. The survey was started in January 2016 and completed in January 2018. The study was carried out in Private Clinics, Hospitals, University Campus, Girls Hostel, Girls College at Allahabad city, U.P, India. Gender and Age based stratification was done to get homogenous population, purposive sampling was done to get 18-48 years female population, after that 150 PCOS patients were recruited as cases and 150 general population were recruited as controls on the basis of Rotterdam Criteria. Subjects having serious metabolic and psychological complications were excluded from the study. All participants were enrolled after obtaining informed consent or assent to participate in the study. Self-made questionnaire was used for assessment of Nutritional Status of the respondents. Psychological Distress Level was assessed by P.G.I Health Questionnaire N1 (By Wig N & Verma S) The present study was carried out in hospitals (for selection of cases) and community area (for selection of controls). The data regarding blood parameters & other comorbidities was based on their medical reports available at the time of survey. SPSS Ver.20 was used as a statistical tool. Chi Square Test was used to test the association between the variables. P value less than .05 (5%) was considered as statistically significant.

## Result

- **Nutritional status**
- **Anthropometric measurement of the respondents**

### 1. Body mass index

		Group		Total
		Case	Control	
Body mass index	Underweight (< 18.5)	27	24	51
	Normal weight (18.5 - 24.9)	46	68	114
	Overweight (25 - 29.9)	57	55	112
	Obese (30-34.9)	20	3	23
Total		150	150	300

$X^2(3) = 17.023, P < .05$  Result: Significant

### 2. Waist/Hip ratio

		Group		Total
		Case	Control	
Waist/Hip ratio	Normal range (W/H ratio < 0.85)	31	64	95
	Central obesity (W/H ratio > 0.85)	119	86	205
	Total	150	150	300

$X^2(1) = 16.775, P < .05$  Result: Significant

- **Nutrient intake**

### 1. Energy intake

		Group		Total
		Case	Control	
Energy intake	Less than RDA (< 1900 kcal/DAY)	26	24	50
	As Per RDA (1900 - 1950 kcal/day)	91	107	198
	More than RDA (> 1950 kcal/day)	33	19	52
Total		150	150	300

$X^2(2) = 5.142, P > .05$  Result: Non Significant

### 2. Fat intake

		Group		Total
		Case	Control	
Fat intake	Less than RDA (Visible fat < 20 G/day)	3	0	3
	As per RDA (Visible fat = 20 G/day)	68	77	145
	More than RDA ( visible fat > 20 G/day)	79	73	152
Total		150	150	300

$X^2(2) = 3.795, P > .05$  Result: Non Significant

### 3. Protein intake

		Group		Total
		Case	Control	
Protein Intake	Less than RDA (< 44 G/day)	57	46	103
	As per RDA (44-55 G/day)	84	104	188
	More than RDA (> 55 G/day)	9	0	9
Total		150	150	300

$X^2(2) = 12.302, P < .05$  Result: Significant

### 4. Carbohydrate intake

		Group		Total
		Case	Control	
Carbohydrate intake	Less than RDA (< 261 G/day)	33	4	37
	As per RDA (261-285 G/day)	83	109	192
	More than RDA (> 285 G/day)	34	37	71
Total		150	150	300

$X^2(2) = 26.377, P < .05$  Result: Significant

### 5. Iron intake

		Group		Total
		Case	Control	
Iron intake	Less than RDA (< 21 MG/day)	123	119	242
	As per RDA (21 MG/day)	27	31	58
Total		150	150	300

$X^2(1) = .342, P > .05$  Result: Non Significant

### 2. Calcium intake

		Group		Total
		Case	Control	
Calcium intake	Less than RDA (< 600 MG/day)	89	80	169
	As per RDA (600 MG/DAY)	61	70	131
Total		150	150	300

$X^2(1) = 1.098, P > .05$  Result: Non Significant

- **Other comorbidities**

### 1. Haemoglobin levels in blood

		Group		Total
		Case	Control	
Haemoglobin levels	Anaemic (< 12 G/DL)	87	20	107
	Non anaemic (> 12 G/DL)	48	114	162
	Never got tested	14	16	30
Total		149	150	299

$X^2(2) = 68.973, P < .05$  Result: Significant

### 2. Blood sugar levels

		Group		Total
		Case	Control	
Blood sugar	Hyperglycaemia or niddm (fasting > 110 MG/DL)	10	0	10
	hypoglycaemia (fasting < 72 MG/DL)	19	5	24
	normal levels (fasting = 72-110 MG/DL)	120	145	265
Total		149	150	299

$X^2(2) = 20.522, P < .05$  Result: Significant

### 3. Blood pressure

		Group		Total
		Case	Control	
Blood pressure	Hypertension (> 120/80 MMHG)	16	4	20
	Hypotension (< 120/80 MMHG)	87	13	100
	Normal B.P (120/80 MMHG)	46	133	179
Total		149	150	299

$X^2(2) = 104.243, P < .05$  Result: Significant

### 4. Thyroid disease

		Group		Total
		Case	Control	
Thyroid disease	Hypothyroidism (TSH = > 4 mU/L)	31	3	34
	None	92	43	135
	Never got tested	27	104	131
Total		150	150	300

$X^2(2) = 86.104, P < .05$  Result: Significant

### 5. Liver disease

		Group		Total
		Case	Control	
Liver disease	Nonalcoholic fatty liver disease	35	4	39
	None	93	63	156
	Never got tested	22	83	105
Total		150	150	300

$X^2(2) = 65.848, P < .05$  Result: Significant

### 6. Pain in bone

		Group		Total
		Case	Control	
Pain in bone	Present	84	13	97
	Absent	65	137	202
Total		149	150	299

$X^2(1) = 77.630, P < .05$  Result: Significant

### • Psychological distress levels of the respondents

		Group		Total
		Case	Control	
Psychological distress levels	Mild neurotic (<10 score)	10	68	78
	Moderate neurotic (11-20 score)	39	58	97
	Severe neurotic (> 21 SCORE)	99	24	123
Total		148	150	298

$X^2(2) = 92.572, P < .05$  Result: Significant

### • Result of hypothesis

**Result HoI:** There is a significant association found between Groups and their ten variables under Nutritional Status (Body Mass Index, Waist/Hip Ratio, Protein Intake, Carbohydrate Intake, Blood Sugar, Blood Pressure, Thyroid Disease, Liver Disease, Haemoglobin Levels, Pain in Bone) while there is no significant association found with rest of the four variables (Energy Intake, Fat Intake, Calcium Intake, Iron Intake). Hence, null hypothesis is rejected, and alternate hypothesis is accepted. Thus, it can be concluded that there is a significant association found between Groups & their Nutritional Status.

**Result HoII:** There is a significant association found between Groups and their Psychological Distress levels. PCOS subjects (Case) were found more Psychologically Distressed than Controls. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Thus, it can be concluded that there is

a significant association found between Groups & their Psychological Distress Levels.

### Discussion

#### • Nutritional Status of The Respondents

#### • Anthropometric Measurements of Respondents

**1. Body Mass Index** – Majority of cases were found overweight, followed by underweight population while 20 obese patients has also been reported among cases even more than controls. This finding is in concordant with finding of Al-Azemi *et al* 2004 who reported that 35%–65% of PCOS patients are obese. However, no. of lean subjects has been witnessed even more than cases having normal BMI [2]

**2. Waist/Hip Ratio** – Majority of cases had central obesity even more than controls. However, central obesity has also been reported more among controls but less than cases. This finding is in concordant with Li *et al.*, 2018 [3] who reported that central obesity is a defining characteristic of polycystic ovary syndrome and PCOS-induced disorders are likely to be exacerbated in the presence of central obesity [3].

#### • Nutrient Intake of Respondents

**1. Energy Intake** – Majority of cases & controls had almost similar energy intake as per RDA. However, subjects having hypercaloric diet & hypocaloric diet has been reported more in cases rather than controls. This finding is in concordant with Wright *et al.* 2004 [4] who reported no difference in energy and macronutrient intakes in women with PCOS compared to non PCOS women [4].

**2. Fat Intake** – Fat consumption has been reported more among cases rather than controls, but difference was not statistically significant. This finding is in concordant with Douglas *et al.* 2006 [5] who reported that PCOS women consumed more fat rather than controls, but difference was not statistically significant [5]. However, 3 cases had low fat consumption too & high fat intake has also been reported in large no. of controls.

**3. Protein Intake** – Majority of cases & controls had normal protein intake, while low protein intake has been reported more in cases rather than controls. However, 9 cases preferred high protein intake in the form of nutritional supplement.

**4. Carbohydrate Intake** – Majority of cases & controls had normal carbohydrate intake, while high carbohydrate intake has been witnessed more among cases rather than controls. However, about 33 cases preferred low carbohydrate intake for weight loss. This finding is in contrast with Farnaz *et al.*, 2016 [6] who reported that PCOS women had higher consumption of high GI food items than their controls [6].

**5. Iron Intake** – Majority of cases & controls had less iron intake while 31 controls had normal iron intake even more than cases.

**6. Calcium Intake** – Majority of cases & controls had less calcium intake followed by 70 controls and 61 cases who had normal calcium intake.

#### • Other Comorbidities

**1. Haemoglobin Level** – Majority of cases were reported to

be anaemic, while majority of controls had normal haemoglobin level. This finding is in contrast with Yejin *et al.*, 2015 <sup>[7]</sup> who reported that hemoglobin levels were significantly elevated in both lean and overweight/obese PCOS groups compared to those in the control groups <sup>[7]</sup>. According to Frank *et al.*, 2011 chronic low-grade inflammation has emerged as a key contributor to the pathogenesis of Polycystic Ovary Syndrome <sup>[8]</sup>. Inflammation may prevent your body from using stored iron to make enough healthy red blood cells, leading to anemia. Along with it, Bad Dietary Choices, Worm Infestation, Excessive Bleeding, etc. might be responsible behind anaemia among cases.

**2. Blood Sugar Level** – Majority of cases & controls had normal blood sugar levels while 19 cases were reported to be hypoglycaemic even more than the controls. This finding is in concordant with previous finding by Kasim-Karakas *et al.*, 2007 <sup>[9]</sup> who reported that PCOS is associated with obesity and an exaggerated insulin response, and reactive hypoglycemia is significantly more prevalent in PCOS sufferers than the general population <sup>[9]</sup>. Likewise, ten cases were found to be hyperglycaemic even more than the controls. PCOS patients are often linked to insulin resistance & hyperglycaemia as per earlier findings. However, this finding is in contrast with Katrine *et al.*, 2017 <sup>[10]</sup> who reported that women with PCOS were four times more likely to develop Type 2 Diabetes compared to their counterparts who did not have the disorder <sup>[10]</sup>. Hence, metformin like drugs must not be prescribed as a part of general treatment of PCOS patients. It must be suggested as per latest medical records of the subjects.

**3. Blood Pressure** – Majority of cases were reported to be hypotensive even more than the controls, while only 16 cases & 4 controls were found hypertensive. Cases & Controls having high BMI were reported to be hypertensive, Hence, obesity might be a prominent factor responsible behind hypertension among both the groups. This finding is in contrast with Chen *et al.*, 2007 <sup>[11]</sup> who found that hyperandrogenism seen in women with PCOS may be associated with hypertensin <sup>[11]</sup>. Likewise in another study, Indu *et al.*, 2018 <sup>[12]</sup> reported that there is a significant association of PCOS with high BP, low HDL levels, elevated FBS, high TGL and consistent USG findings <sup>[12]</sup>.

**4. Thyroid Disease** – Major population in both the groups had no hypothyroidism. However, 31 cases (20.6%) had hypothyroidism even more than the controls. This finding is in concordant with Sinha *et al* 2013 <sup>[13]</sup> who reported 22.5% subjects with PCOS were detected to be having subclinical hypothyroidism <sup>[13]</sup>.

**5. Liver Disease** – Major population in both the groups had no NAFLD. However, 35 cases (23.3%) had NAFLD even more than the controls. This finding is in concordant with Balachandran *et al.*, 2018 who reported an increased rate of NAFLD in PCOS, and this extended to lean women with PCOS, indicative of androgen excess as a likely major causal factor <sup>[14]</sup>.

**6. Pain In Bone** – Majority of cases had bone pain, while majority of controls had no bone pain. Vitamin D Deficiency and Calcium Deficiency had been reported among large no. of cases as per their medical records, which might be a culprit

factor behind bone pain. This finding is concordant with previous finding of Osama *et al.*, 2018 who reported that the prevalence of hypovitaminosis D (serum 25(OH) D <30 ng/ml) was higher in PCOS group than control group (77.8% vs. 12.3%). (15)

**Psychological Distress Levels of the Respondents:** Most of the PCOS subjects were reported severe neurotic while most of the controls were found moderate neurotic. Chi-Square test value is  $X^2(2) = 92.572$ ,  $P < .05$  Hence, there is a significant association found between Groups & Psychological Distress Levels. This result is concordant with finding of Barry *et al.*, 2011 who revealed that patients with PCOS were significantly more neurotic (had difficulty coping with stress), anxious and depressed than the controls <sup>[16]</sup> PCOS affects quality of life and can worsen existing anxiety and depression either due to the features of PCOS or due to the diagnosis of a chronic disease as reported by Farideh *et al.*, 2012 <sup>[17]</sup>.

### Conclusion

There has been wide variation reported among both the groups as far as their Nutritional Status is concerned. Majority of Cases (PCOS population) comes under moderate to severe neuroticism, while mild to moderate level neuroticism has been reported among Controls. The present study reveals that Nutritional Status of PCOS population were found in more compromised situation than Controls & it has a strong influence on Psychological Distress Levels of the Subjects. However, larger studies may have the power to detect the relationship.

**Conflict of Interest:** None Declared

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